

SEQUENCE LISTING

<110> Aventis Pharma SA

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<120> NUCLEIC ACIDS OF THE HUMAN ABCA12 GENE, VECTORS CONTAINING SUCH NUCLEIC ACIDS, AND USES THEREOF

<130> 03806.0537

<150> US 60/267,715

<151> 2001-02-12

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<170> PatentIn version 3.0

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<211> 2595

<212> PRT

<213> Homo sapiens

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<221> Xaa

<222> (1)..(2595)

<223> Xaa = any amino acid

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Pro Val Ile Ile Phe Ile Ile Leu Ala Ile Thr Arg Thr Lys Phe Pro
35 40 45
Pro Thr Ala Lys Pro Thr Cys Tyr Leu Ala Pro Arg Asn Leu Pro Ser
50 55 60
Thr Gly Phe Phe Pro Phe Leu Gln Thr Leu Leu Cys Asp Thr Asp Ser
65 70 75 80
Lys Cys Lys Asp Thr Pro Tyr Gly Pro Gln Asp Leu Leu Arg Arg Lys
85 90 95
Gly Ile Asp Asp Ala Leu Phe Lys Asp Ser Glu Ile Leu Arg Lys Ser
100 105 110
Ser Asn Leu Asp Lys Asp Ser Ser Leu Ser Phe Gln Ser Thr Gln Val
115 120 125
Pro Glu Arg Arg His Ala Ser Leu Ala Thr Val Phe Pro Ser Pro Ser
130 135 140
Ser Asp Leu Glu Ile Pro Gly Thr Tyr Thr Phe Asn Gly Ser Gln Val
145 150 155 160
Leu Ala Arg Ile Leu Gly Leu Glu Lys Leu Leu Lys Gln Asn Ser Thr
165 170 175
Ser Glu Asp Ile Arg Arg Glu Leu Cys Asp Ser Tyr Ser Gly Tyr Ile
180 185 190
Val Asp Asp Ala Phe Ser Trp Thr Phe Leu Gly Arg Asn Val Phe Asn
195 200 205
Lys Phe Cys Leu Ser Asn Met Thr Leu Leu Glu Ser Ser Leu Gln Glu
210 215 220
Leu Asn Lys Gln Phe Ser Gln Leu Ser Ser Asp Pro Asn Asn Gln Lys
225 230 235 240
Ile Val Phe Gln Glu Ile Val Arg Met Leu Ser Phe Phe Ser Gln Val
245 250 255
Gln Glu Gln Lys Ala Val Trp Gln Leu Leu Ser Ser Phe Pro Asn Val
260 265 270
Phe Gln Asn Asp Thr Ser Leu Ser Asn Leu Phe Asp Val Leu Arg Lys
275 280 285
Ala Asn Ser Val Leu Leu Val Val Gln Lys Val Tyr Pro Arg Phe Ala
290 295 300

Thr Asn Glu Gly Phe Arg Thr Leu Gln Lys Ser Val Lys His Leu Leu
 305 310 315 320
 Tyr Thr Leu Asp Ser Pro Ala Gln Gly Asp Ser Asp Asn Ile Thr His
 325 330 335
 Val Trp Asn Glu Asp Asp Gly Gln Thr Leu Ser Pro Ser Ser Leu Ala
 340 345 350
 Ala Gln Leu Leu Ile Leu Glu Asn Phe Glu Asp Ala Leu Leu Asn Ile
 355 360 365
 Ser Ala Asn Ser Pro Tyr Ile Pro Tyr Leu Ala Cys Val Arg Asn Val
 370 375 380
 Thr Asp Ser Leu Ala Arg Gly Ser Pro Glu Asn Leu Arg Leu Leu Gln
 385 390 395 400
 Ser Thr Ile Arg Phe Lys Lys Ser Phe Leu Arg Asn Gly Ser Tyr Glu
 405 410 415
 Asp Tyr Phe Pro Pro Val Pro Glu Val Leu Lys Ser Lys Leu Ser Gln
 420 425 430
 Leu Arg Asn Leu Thr Glu Leu Leu Cys Glu Ser Glu Thr Phe Ser Leu
 435 440 445
 Ile Glu Lys Ser Cys Gln Leu Ser Asp Met Ser Phe Gly Ser Leu Cys
 450 455 460
 Glu Glu Ser Glu Phe Asp Leu Gln Leu Leu Glu Ala Ala Glu Leu Gly
 465 470 475 480
 Thr Glu Ile Ala Ala Ser Leu Leu Tyr His Asp Asn Val Ile Ser Lys
 485 490 495
 Lys Val Arg Asp Leu Leu Thr Gly Asp Pro Ser Lys Ile Asn Leu Asn
 500 505 510
 Met Asp Gln Phe Leu Glu Gln Ala Leu Gln Met Asn Tyr Leu Glu Asn
 515 520 525
 Ile Thr Gln Leu Ile Pro Ile Ile Glu Ala Met Leu His Val Asn Asn
 530 535 540
 Ser Ala Asp Ala Ser Glu Lys Pro Gly Gln Leu Leu Glu Met Phe Lys
 545 550 555 560
 Asn Val Glu Glu Leu Lys Glu Asp Leu Arg Arg Thr Thr Gly Met Ser
 565 570 575
 Asn Arg Thr Ile Asp Lys Leu Leu Ala Ile Pro Ile Pro Asp Asn Arg
 580 585 590
 Ala Glu Ile Ile Ser Gln Val Phe Trp Leu His Ser Cys Asp Thr Asn
 595 600 605
 Ile Thr Thr Pro Lys Leu Glu Asp Ala Met Lys Glu Phe Cys Asn Leu
 610 615 620
 Ser Leu Ser Glu Arg Ser Arg Gln Ser Tyr Leu Ile Gly Leu Thr Leu
 625 630 635 640
 Leu His Tyr Leu Asn Ile Tyr Asn Phe Thr Asp Lys Val Phe Phe Pro
 22

Gln Thr	Thr Arg Ser Leu Arg Thr	Lys Ile Trp Ala Pro	Gly Pro His
	995	1000	1005
Asn Ser	Pro Ser His Asn Gln	Ile Tyr Gly Arg Ala	Phe Ile Tyr
1010		1015	1020
Leu Gln	Asp Ser Ile Glu Arg	Ala Ile Ile Glu Leu	Gln Thr Gly
1025		1030	1035
Arg Asn	Ser Gln Glu Ile Ala	Val Gln Val Gln Ala	Ile Pro Tyr
1040		1045	1050
Pro Cys	Phe Met Lys Asp Asn	Phe Leu Thr Ser Val	Ser Tyr Ser
1055		1060	1065
Leu Pro	Ile Val Leu Met Val	Ala Trp Val Val Phe	Ile Ala Ala
1070		1075	1080
Phe Val	Lys Lys Leu Val Tyr	Glu Lys Asp Leu Arg	Leu His Glu
1085		1090	1095
Tyr Met	Lys Met Met Gly Val	Asn Ser Cys Ser His	Phe Phe Ala
1100		1105	1110
Trp Leu	Ile Glu Ser Val Gly	Phe Leu Leu Val Thr	Ile Val Ile
1115		1120	1125
Leu Ile	Ile Ile Leu Lys Phe	Gly Asn Ile Leu Pro	Lys Thr Asn
1130		1135	1140
Gly Phe	Ile Leu Phe Leu Tyr	Phe Ser Asp Tyr Ser	Phe Ser Val
1145		1150	1155
Ile Ala	Met Ser Tyr Leu Ile	Ser Val Phe Phe Asn	Asn Thr Asn
1160		1165	1170
Ile Ala	Ala Leu Ile Gly Ser	Leu Ile Tyr Ile Ile	Ala Phe Phe
1175		1180	1185
Pro Phe	Ile Val Leu Val Thr	Val Glu Asn Glu Leu	Ser Tyr Val
1190		1195	1200
Leu Lys	Val Phe Met Ser Leu	Leu Ser Pro Thr Ala	Phe Ser Tyr
1205		1210	1215
Ala Ser	Gln Tyr Ile Ala Arg	Tyr Glu Glu Gln Gly	Ile Gly Leu
1220		1225	1230
Gln Trp	Glu Asn Met Tyr Thr	Ser Pro Val Gln Asp	Asp Thr Thr
1235		1240	1245
Ser Phe	Gly Trp Leu Cys Cys	Leu Ile Leu Ala Asp	Ser Phe Ile
1250		1255	1260
Tyr Phe	Leu Ile Ala Trp Tyr	Val Arg Asn Val Phe	Pro Gly Thr
1265		1270	1275
Tyr Gly	Met Ala Ala Pro Trp	Tyr Phe Pro Ile Leu	Pro Ser Tyr
1280		1285	1290
Trp Lys	Glu Arg Phe Gly Cys	Ala Glu Val Lys Pro	Glu Lys Ser
1295		1300	1305

Asn Gly 1310	Leu Met Phe Thr	Asn Ile Met Met Gln 1315	Asn Thr Asn Pro 1320
Ser Ala 1325	Ser Pro Glu Tyr	Met Phe Ser Ser Asn 1330	Ile Glu Pro Glu 1335
Pro Lys 1340	Asp Leu Thr Val	Gly Val Ala Leu His 1345	Gly Val Thr Lys 1350
Ile Tyr 1355	Gly Ser Lys Val	Ala Val Asp Asn Leu 1360	Asn Leu Asn Phe 1365
Tyr Glu 1370	Gly His Ile Thr	Ser Leu Leu Gly Pro 1375	Asn Gly Ala Gly 1380
Lys Thr 1385	Thr Thr Ile Ser	Met Leu Thr Gly Leu 1390	Phe Gly Ala Ser 1395
Ala Gly 1400	Thr Ile Phe Val	Tyr Gly Lys Asp Ile 1405	Lys Thr Asp Leu 1410
His Thr 1415	Val Arg Lys Asn	Met Gly Val Cys Met 1420	Gln His Asp Val 1425
Leu Phe 1430	Ser Tyr Leu Thr	Thr Lys Glu His Leu 1435	Leu Leu Tyr Gly 1440
Ser Ile 1445	Lys Val Pro His	Trp Thr Lys Lys Gln 1450	Leu His Glu Glu 1455
Val Lys 1460	Arg Thr Leu Lys	Asp Thr Gly Leu Tyr 1465	Ser His Arg His 1470
Lys Arg 1475	Val Gly Thr Leu	Ser Gly Gly Met Lys 1480	Arg Lys Leu Ser 1485
Ile Ser 1490	Ile Ala Leu Ile	Gly Gly Ser Arg Val 1495	Val Ile Leu Asp 1500
Glu Pro 1505	Ser Thr Gly Val	Asp Pro Cys Ser Arg 1510	Arg Ser Ile Trp 1515
Asp Val 1520	Ile Ser Lys Asn	Lys Thr Ala Arg Thr 1525	Ile Ile Leu Ser 1530
Thr His 1535	His Leu Asp Glu	Ala Glu Val Leu Ser 1540	Asp Arg Ile Ala 1545
Phe Leu 1550	Glu Gln Gly Gly	Leu Arg Cys Cys Gly 1555	Ser Pro Phe Tyr 1560
Leu Lys 1565	Glu Ala Phe Gly	Asp Gly Tyr His Leu 1570	Thr Leu Thr Lys 1575
Lys Lys 1580	Ser Pro Asn Leu	Asn Ala Asn Ala Val 1585	Cys Asp Thr Met 1590
Ala Val 1595	Thr Ala Met Ile	Gln Ser His Leu Pro 1600	Glu Ala Tyr Leu 1605
Lys Glu 1610	Asp Ile Gly Gly	Glu Leu Val Tyr Val 1615	Leu Pro Pro Phe 1620
Ser Thr	Lys Val Ser Gly Ala	Tyr Leu Ser Leu Leu	Arg Ala Leu

1625	1630	1635
Asp Asn Gly Met Gly Asp 1640	Leu Asn Ile Gly Cys 1645	Tyr Gly Ile Ser 1650
Asp Thr Thr Val Glu Glu 1655	Val Phe Leu Asn Leu 1660	Thr Lys Glu Ser 1665
Gln Lys Asn Ser Ala Met 1670	Ser Leu Glu His Leu 1675	Thr Gln Lys Lys 1680
Ile Gly Asn Ser Asn Ala 1685	Asn Gly Ile Ser Thr 1690	Pro Asp Asp Leu 1695
Ser Val Ser Ser Ser Asn 1700	Phe Thr Asp Arg Asp 1705	Asp Lys Ile Leu 1710
Thr Arg Gly Glu Arg Leu 1715	Asp Gly Phe Gly Leu 1720	Leu Leu Lys Lys 1725
Ile Met Ala Ile Leu Ile 1730	Lys Arg Phe His His 1735	Xaa Arg Arg Asn 1740
Trp Lys Gly Leu Ile Ala 1745	Gln Val Ile Leu Pro 1750	Ile Val Phe Val 1755
Thr Thr Ala Met Gly Leu 1760	Gly Thr Leu Arg Asn 1765	Ser Ser Asn Ser 1770
Tyr Pro Glu Ile Gln Ile 1775	Ser Pro Ser Leu Tyr 1780	Gly Thr Ser Glu 1785
Gln Thr Ala Phe Tyr Ala 1790	Asn Tyr His Pro Ser 1795	Thr Glu Ala Leu 1800
Val Ser Ala Met Trp Asp 1805	Phe Pro Gly Ile Asp 1810	Asn Met Cys Leu 1815
Asn Thr Ser Asp Leu Gln 1820	Cys Leu Asn Lys Asp 1825	Ser Leu Glu Lys 1830
Trp Asn Thr Ser Gly Glu 1835	Pro Ile Thr Asn Phe 1840	Gly Val Cys Ser 1845
Cys Ser Glu Asn Val Gln 1850	Glu Cys Pro Lys Phe 1855	Asn Tyr Ser Pro 1860
Pro His Arg Arg Thr Tyr 1865	Ser Ser Gln Val Ile 1870	Tyr Asn Leu Thr 1875
Gly Gln Arg Val Glu Asn 1880	Tyr Leu Ile Ser Thr 1885	Ala Asn Glu Phe 1890
Val Gln Lys Arg Tyr Gly 1895	Gly Trp Ser Phe Gly 1900	Leu Pro Leu Thr 1905
Lys Asp Leu Arg Phe Asp 1910	Ile Thr Gly Val Pro 1915	Ala Asn Arg Thr 1920
Leu Ala Lys Val Trp Tyr 1925	Asp Pro Glu Gly Tyr 1930	His Ser Leu Pro 1935
Ala Tyr Leu Asn Ser Leu 1940	Asn Asn Phe Leu Leu 1945	Arg Val Asn Met 1950

Ser	Lys	Tyr	Asp	Ala	Ala	Arg	His	Gly	Ile	Ile	Met	Tyr	Ser	His
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Pro	Tyr	Pro	Gly	Val	Gln	Asp	Gln	Glu	Gln	Ala	Thr	Ile	Ser	Ser
1970						1975					1980			
Leu	Ile	Asp	Ile	Leu	Val	Ala	Leu	Ser	Ile	Leu	Met	Gly	Tyr	Ser
1985						1990					1995			
Val	Thr	Thr	Ala	Ser	Phe	Val	Thr	Tyr	Val	Val	Arg	Glu	His	Gln
2000						2005					2010			
Thr	Lys	Ala	Lys	Gln	Leu	Gln	His	Ile	Ser	Gly	Ile	Gly	Val	Thr
2015						2020					2025			
Cys	Tyr	Trp	Val	Thr	Asn	Phe	Ile	Tyr	Asp	Met	Val	Phe	Tyr	Leu
2030						2035					2040			
Val	Pro	Val	Ala	Phe	Ser	Ile	Gly	Ile	Ile	Ala	Ile	Phe	Lys	Leu
2045						2050					2055			
Pro	Ala	Phe	Tyr	Ser	Glu	Asn	Asn	Leu	Gly	Ala	Val	Ser	Leu	Leu
2060						2065					2070			
Leu	Leu	Leu	Phe	Gly	His	Ala	Thr	Phe	Ser	Trp	Met	Tyr	Leu	Leu
2075						2080					2085			
Ala	Gly	Leu	Phe	His	Glu	Thr	Gly	Met	Ala	Phe	Ile	Thr	Tyr	Val
2090						2095					2100			
Cys	Val	Asn	Leu	Phe	Phe	Gly	Ile	Asn	Ser	Ile	Val	Ser	Leu	Ser
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Val	Val	Tyr	Phe	Leu	Ser	Lys	Glu	Lys	Pro	Asn	Asp	Pro	Thr	Leu
2120						2125					2130			
Glu	Leu	Ile	Ser	Glu	Thr	Leu	Lys	Arg	Ile	Phe	Leu	Ile	Phe	Pro
2135						2140					2145			
Gln	Phe	Cys	Phe	Gly	Tyr	Gly	Leu	Ile	Glu	Leu	Ser	Gln	Gln	Gln
2150						2155					2160			
Ser	Val	Leu	Asp	Phe	Leu	Lys	Ala	Tyr	Gly	Val	Glu	Tyr	Pro	Asn
2165						2170					2175			
Glu	Thr	Phe	Glu	Met	Asn	Lys	Leu	Gly	Ala	Met	Phe	Val	Ala	Leu
2180						2185					2190			
Val	Ser	Gln	Gly	Thr	Met	Phe	Phe	Ser	Leu	Arg	Leu	Leu	Ile	Asn
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Glu	Ser	Leu	Ile	Lys	Lys	Leu	Arg	Leu	Phe	Phe	Arg	Lys	Phe	Asn
2210						2215					2220			
Ser	Ser	His	Val	Arg	Glu	Thr	Ile	Asp	Glu	Asp	Glu	Asp	Val	Arg
2225						2230					2235			
Ala	Glu	Arg	Leu	Arg	Val	Glu	Ser	Gly	Ala	Ala	Glu	Phe	Asp	Leu
2240						2245					2250			
Val	Gln	Leu	Tyr	Cys	Leu	Thr	Lys	Thr	Tyr	Gln	Leu	Ile	His	Lys
2255						2260					2265			

Lys	Ile	Ile	Ala	Val	Asn	Asn	Ile	Ser	Ile	Gly	Ile	Pro	Ala	Gly
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Glu	Cys	Phe	Gly	Leu	Leu	Gly	Val	Asn	Gly	Ala	Gly	Lys	Thr	Thr
	2285					2290					2295			
Ile	Phe	Lys	Met	Leu	Thr	Gly	Asp	Ile	Ile	Pro	Ser	Ser	Gly	Asn
	2300					2305					2310			
Ile	Leu	Ile	Arg	Asn	Lys	Thr	Gly	Ser	Leu	Gly	His	Val	Asp	Ser
	2315					2320					2325			
His	Ser	Ser	Leu	Val	Gly	Tyr	Cys	Pro	Gln	Glu	Asp	Ala	Leu	Asp
	2330					2335					2340			
Asp	Leu	Val	Thr	Val	Glu	Glu	His	Leu	Tyr	Phe	Tyr	Ala	Arg	Val
	2345					2350					2355			
His	Gly	Ile	Pro	Glu	Lys	Asp	Ile	Lys	Glu	Thr	Val	His	Lys	Leu
	2360					2365					2370			
Leu	Arg	Arg	Leu	His	Leu	Met	Pro	Phe	Lys	Asp	Arg	Ala	Thr	Ser
	2375					2380					2385			
Met	Cys	Ser	Tyr	Gly	Thr	Lys	Arg	Lys	Leu	Ser	Thr	Ala	Leu	Ala
	2390					2395					2400			
Leu	Ile	Gly	Lys	Pro	Ser	Ile	Leu	Leu	Leu	Asp	Glu	Pro	Ser	Ser
	2405					2410					2415			
Gly	Met	Asp	Pro	Lys	Ser	Lys	Arg	His	Leu	Trp	Lys	Ile	Ile	Ser
	2420					2425					2430			
Glu	Glu	Val	Gln	Asn	Lys	Cys	Ser	Val	Ile	Leu	Thr	Ser	His	Ser
	2435					2440					2445			
Met	Glu	Glu	Cys	Glu	Ala	Leu	Cys	Thr	Arg	Leu	Ala	Ile	Met	Val
	2450					2455					2460			
Asn	Gly	Lys	Phe	Gln	Cys	Ile	Gly	Ser	Leu	Gln	His	Ile	Lys	Ser
	2465					2470					2475			
Arg	Phe	Gly	Arg	Gly	Phe	Thr	Val	Lys	Val	His	Leu	Lys	Asn	Asn
	2480					2485					2490			
Lys	Val	Thr	Met	Glu	Thr	Leu	Thr	Lys	Phe	Met	Gln	Leu	His	Phe
	2495					2500					2505			
Pro	Lys	Thr	Tyr	Leu	Lys	Asp	Gln	His	Leu	Ser	Met	Leu	Glu	Tyr
	2510					2515					2520			
His	Val	Pro	Val	Thr	Ala	Gly	Gly	Val	Ala	Asn	Ile	Phe	Asp	Leu
	2525					2530					2535			
Leu	Glu	Thr	Asn	Lys	Thr	Ala	Leu	Asn	Ile	Thr	Asn	Phe	Leu	Val
	2540					2545					2550			
Ser	Gln	Thr	Thr	Leu	Glu	Glu	Val	Phe	Ile	Asn	Phe	Ala	Lys	Asp
	2555					2560					2565			
Gln	Lys	Ser	Tyr	Glu	Thr	Ala	Asp	Thr	Ser	Ser	Gln	Gly	Ser	Thr
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Ile	Ser	Val	Asp	Ser	Gln	Asp	Asp	Gln	Met	Glu	Ser			

2585

2590

2595

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<212> PRT

<213> Homo sapiens

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<221> Xaa

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<223> Xaa = any amino acid

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35 40 45Pro Thr Ala Lys Pro Thr Cys Tyr Leu Ala Pro Arg Asn Leu Pro Ser
50 55 60Thr Gly Phe Phe Pro Phe Leu Gln Thr Leu Leu Cys Asp Thr Asp Ser
65 70 75 80Lys Cys Lys Asp Thr Pro Tyr Gly Pro Gln Asp Leu Leu Arg Arg Lys
85 90 95Gly Ile Asp Asp Ala Leu Phe Lys Asp Ser Glu Ile Leu Arg Lys Ser
100 105 110Ser Asn Leu Asp Lys Asp Ser Ser Leu Ser Phe Gln Ser Thr Gln Val
115 120 125Pro Glu Arg Arg His Ala Ser Leu Ala Thr Val Phe Pro Ser Pro Ser
130 135 140Ser Asp Leu Glu Ile Pro Gly Thr Tyr Thr Phe Asn Gly Ser Gln Val
145 150 155 160Leu Ala Arg Ile Leu Gly Leu Glu Lys Leu Leu Lys Gln Asn Ser Thr
165 170 175Ser Glu Asp Ile Arg Arg Glu Leu Cys Asp Ser Tyr Ser Gly Tyr Ile
180 185 190Val Asp Asp Ala Phe Ser Trp Thr Phe Leu Gly Arg Asn Val Phe Asn
195 200 205Lys Phe Cys Leu Ser Asn Met Thr Leu Leu Glu Ser Ser Leu Gln Glu
29

210

215

220

Leu Asn Lys Gln Phe Ser Gln Leu Ser Ser Asp Pro Asn Asn Gln Lys
 225 230 235 240

Ile Val Phe Gln Glu Ile Val Arg Met Leu Ser Phe Phe Ser Gln Val
 245 250 255

Gln Glu Gln Lys Ala Val Trp Gln Leu Leu Ser Ser Phe Pro Asn Val
 260 265 270

Phe Gln Asn Asp Thr Ser Leu Ser Asn Leu Phe Asp Val Leu Arg Lys
 275 280 285

Ala Asn Ser Val Leu Leu Val Val Gln Lys Val Tyr Pro Arg Phe Ala
 290 295 300

Thr Asn Glu Gly Phe Arg Thr Leu Gln Lys Ser Val Lys His Leu Leu
 305 310 315 320

Tyr Thr Leu Asp Ser Pro Ala Gln Gly Asp Ser Asp Asn Ile Thr His
 325 330 335

Val Trp Asn Glu Asp Asp Gly Gln Thr Leu Ser Pro Ser Ser Leu Ala
 340 345 350

Ala Gln Leu Leu Ile Leu Glu Asn Phe Glu Asp Ala Leu Leu Asn Ile
 355 360 365

Ser Ala Asn Ser Pro Tyr Ile Pro Tyr Leu Ala Cys Val Arg Asn Val
 370 375 380

Thr Asp Ser Leu Ala Arg Gly Ser Pro Glu Asn Leu Arg Leu Leu Gln
 385 390 395 400

Ser Thr Ile Arg Phe Lys Lys Ser Phe Leu Arg Asn Gly Ser Tyr Glu
 405 410 415

Asp Tyr Phe Pro Pro Val Pro Glu Val Leu Lys Ser Lys Leu Ser Gln
 420 425 430

Leu Arg Asn Leu Thr Glu Leu Leu Cys Glu Ser Glu Thr Phe Ser Leu
 435 440 445

Ile Glu Lys Ser Cys Gln Leu Ser Asp Met Ser Phe Gly Ser Leu Cys
 450 455 460

Glu Glu Ser Glu Phe Asp Leu Gln Leu Leu Glu Ala Ala Glu Leu Gly
 465 470 475 480

Thr Glu Ile Ala Ala Ser Leu Leu Tyr His Asp Asn Val Ile Ser Lys
 485 490 495

Lys Val Arg Asp Leu Leu Thr Gly Asp Pro Ser Lys Ile Asn Leu Asn
 500 505 510

Met Asp Gln Phe Leu Glu Gln Ala Leu Gln Met Asn Tyr Leu Glu Asn
 515 520 525

Ile Thr Gln Leu Ile Pro Ile Ile Glu Ala Met Leu His Val Asn Asn
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Ser Ala Asp Ala Ser Glu Lys Pro Gly Gln Leu Leu Glu Met Phe Lys
 545 550 555 560

Asn	Val	Glu	Glu	Leu	Lys	Glu	Asp	Leu	Arg	Arg	Thr	Thr	Gly	Met	Ser
				565					570					575	
Asn	Arg	Thr	Ile	Asp	Lys	Leu	Leu	Ala	Ile	Pro	Ile	Pro	Asp	Asn	Arg
			580					585					590		
Ala	Glu	Ile	Ile	Ser	Gln	Val	Phe	Trp	Leu	His	Ser	Cys	Asp	Thr	Asn
		595					600					605			
Ile	Thr	Thr	Pro	Lys	Leu	Glu	Asp	Ala	Met	Lys	Glu	Phe	Cys	Asn	Leu
	610					615					620				
Ser	Leu	Ser	Glu	Arg	Ser	Arg	Gln	Ser	Tyr	Leu	Ile	Gly	Leu	Thr	Leu
625					630					635					640
Leu	His	Tyr	Leu	Asn	Ile	Tyr	Asn	Phe	Thr	Asp	Lys	Val	Phe	Phe	Pro
				645					650					655	
Arg	Lys	Asp	Gln	Lys	Pro	Val	Glu	Lys	Met	Met	Glu	Leu	Phe	Ile	Arg
			660					665					670		
Leu	Lys	Glu	Ile	Leu	Asn	Gln	Met	Ala	Ser	Gly	Thr	His	Pro	Leu	Leu
		675					680					685			
Asp	Lys	Met	Arg	Ser	Leu	Lys	Gln	Met	His	Leu	Pro	Arg	Ser	Val	Pro
	690					695					700				
Leu	Thr	Gln	Ala	Met	Tyr	Arg	Ser	Asn	Arg	Met	Asn	Thr	Pro	Gln	Gly
705					710					715					720
Ser	Phe	Ser	Thr	Ile	Ser	Gln	Ala	Leu	Cys	Ser	Gln	Gly	Ile	Thr	Thr
				725					730					735	
Glu	Tyr	Leu	Thr	Ala	Met	Leu	Pro	Ser	Ser	Gln	Arg	Pro	Lys	Gly	Asn
			740					745					750		
His	Thr	Lys	Asp	Phe	Leu	Thr	Tyr	Lys	Leu	Thr	Lys	Glu	Gln	Ile	Ala
		755					760					765			
Ser	Lys	Tyr	Gly	Ile	Pro	Ile	Asn	Thr	Thr	Pro	Phe	Cys	Phe	Ser	Leu
	770					775					780				
Tyr	Lys	Asp	Ile	Ile	Asn	Met	Pro	Ala	Gly	Pro	Val	Ile	Trp	Ala	Phe
785					790					795					800
Leu	Lys	Pro	Met	Leu	Leu	Gly	Arg	Ile	Leu	His	Ala	Pro	Tyr	Asn	Pro
				805					810					815	
Val	Thr	Lys	Ala	Ile	Met	Glu	Lys	Ser	Asn	Val	Thr	Leu	Arg	Gln	Leu
			820					825					830		
Ala	Glu	Leu	Arg	Glu	Lys	Ser	Gln	Glu	Trp	Met	Asp	Lys	Ser	Pro	Leu
		835					840					845			
Phe	Met	Asn	Ser	Phe	His	Leu	Leu	Asn	Gln	Ala	Ile	Pro	Met	Leu	Gln
	850					855					860				
Asn	Thr	Leu	Arg	Asn	Pro	Phe	Val	Gln	Val	Phe	Val	Lys	Phe	Ser	Val
865					870					875					880
Gly	Leu	Asp	Ala	Val	Glu	Leu	Leu	Lys	Gln	Ile	Asp	Glu	Leu	Asp	Ile
				885					890					895	

Leu Arg Leu Lys Leu Glu Asn Asn Ile Asp Ile Ile Asp Gln Leu Asn
900 905 910

Thr Leu Ser Ser Leu Thr Val Asn Ile Ser Ser Cys Val Leu Tyr Asp
915 920 925

Arg Ile Gln Ala Ala Lys Thr Ile Asp Glu Met Glu Arg Glu Ala Lys
930 935 940

Arg Leu Tyr Lys Ser Asn Glu Leu Phe Gly Ser Val Ile Phe Lys Leu
945 950 955 960

Pro Ser Asn Arg Ser Trp His Arg Gly Tyr Asp Ser Gly Asn Val Phe
965 970 975

Leu Pro Pro Val Ile Lys Tyr Thr Ile Arg Met Ser Leu Lys Thr Ala
980 985 990

Gln Thr Thr Arg Ser Leu Arg Thr Lys Ile Trp Ala Pro Gly Pro His
995 1000 1005

Asn Ser Pro Ser His Asn Gln Ile Tyr Gly Arg Ala Phe Ile Tyr
1010 1015 1020

Leu Gln Asp Ser Ile Glu Arg Ala Ile Ile Glu Leu Gln Thr Gly
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Arg Asn Ser Gln Glu Ile Ala Val Gln Val Gln Ala Ile Pro Tyr
1040 1045 1050

Pro Cys Phe Met Lys Asp Asn Phe Leu Thr Ser Val Ser Tyr Ser
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Leu Pro Ile Val Leu Met Val Ala Trp Val Val Phe Ile Ala Ala
1070 1075 1080

Phe Val Lys Lys Leu Val Tyr Glu Lys Asp Leu Arg Leu His Glu
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Tyr Met Lys Met Met Gly Val Asn Ser Cys Ser His Phe Phe Ala
1100 1105 1110

Trp Leu Ile Glu Ser Val Gly Phe Leu Leu Val Thr Ile Val Ile
1115 1120 1125

Leu Ile Ile Ile Leu Lys Phe Gly Asn Ile Leu Pro Lys Thr Asn
1130 1135 1140

Gly Phe Ile Leu Phe Leu Tyr Phe Ser Asp Tyr Ser Phe Ser Val
1145 1150 1155

Ile Ala Met Ser Tyr Leu Ile Ser Val Phe Phe Asn Asn Thr Asn
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Ile Ala Ala Leu Ile Gly Ser Leu Ile Tyr Ile Ile Ala Phe Phe
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Pro Phe Ile Val Leu Val Thr Val Glu Asn Glu Leu Ser Tyr Val
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Leu Lys Val Phe Met Ser Leu Leu Ser Pro Thr Ala Phe Ser Tyr
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Ala Ser Gln Tyr Ile Ala Arg Tyr Glu Glu Gln Gly Ile Gly Leu
32

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 Gln Trp Glu Asn Met Tyr Thr Ser Pro Val Gln Asp Asp Thr Thr
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 Ser Phe Gly Trp Leu Cys Cys Leu Ile Leu Ala Asp Ser Phe Ile
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 Tyr Phe Leu Ile Ala Trp Tyr Val Arg Asn Val Phe Pro Gly Thr
 1265 1270 1275
 Tyr Gly Met Ala Ala Pro Trp Tyr Phe Pro Ile Leu Pro Ser Tyr
 1280 1285 1290
 Trp Lys Glu Arg Phe Gly Cys Ala Glu Val Lys Pro Glu Lys Ser
 1295 1300 1305
 Asn Gly Leu Met Phe Thr Asn Ile Met Met Gln Asn Thr Asn Pro
 1310 1315 1320
 Ser Ala Ser Pro Glu Tyr Met Phe Ser Ser Asn Ile Glu Pro Glu
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 Pro Lys Asp Leu Thr Val Gly Val Ala Leu His Gly Val Thr Lys
 1340 1345 1350
 Ile Tyr Gly Ser Lys Val Ala Val Asp Asn Leu Asn Leu Asn Phe
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 Tyr Glu Gly His Ile Thr Ser Leu Leu Gly Pro Asn Gly Ala Gly
 1370 1375 1380
 Lys Thr Thr Thr Ile Ser Met Leu Thr Gly Leu Phe Gly Ala Ser
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 Ala Gly Thr Ile Phe Val Tyr Gly Lys Asp Ile Lys Thr Asp Leu
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 His Thr Val Arg Lys Asn Met Gly Val Cys Met Gln His Asp Val
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 Leu Phe Ser Tyr Leu Thr Thr Lys Glu His Leu Leu Leu Tyr Gly
 1430 1435 1440
 Ser Ile Lys Val Pro His Trp Thr Lys Lys Gln Leu His Glu Glu
 1445 1450 1455
 Val Lys Arg Thr Leu Lys Asp Thr Gly Leu Tyr Ser His Arg His
 1460 1465 1470
 Lys Arg Val Gly Thr Leu Ser Gly Gly Met Lys Arg Lys Leu Ser
 1475 1480 1485
 Ile Ser Ile Ala Leu Ile Gly Gly Ser Arg Val Val Ile Leu Asp
 1490 1495 1500
 Glu Pro Ser Thr Gly Val Asp Pro Cys Ser Arg Arg Ser Ile Trp
 1505 1510 1515
 Asp Val Ile Ser Lys Asn Lys Thr Ala Arg Thr Ile Ile Leu Ser
 1520 1525 1530
 Thr His His Leu Asp Glu Ala Glu Val Leu Ser Asp Arg Ile Ala
 1535 1540 1545

Phe	Leu	Glu	Gln	Gly	Gly	Leu	Arg	Cys	Cys	Gly	Ser	Pro	Phe	Tyr
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Leu	Lys	Glu	Ala	Phe	Gly	Asp	Gly	Tyr	His	Leu	Thr	Leu	Thr	Lys
1565						1570					1575			
Lys	Lys	Val	Phe	Leu	Asn	Leu	Thr	Lys	Glu	Ser	Gln	Lys	Asn	Ser
1580						1585					1590			
Ala	Met	Ser	Leu	Glu	His	Leu	Thr	Gln	Lys	Lys	Ile	Gly	Asn	Ser
1595						1600					1605			
Asn	Ala	Asn	Gly	Ile	Ser	Thr	Pro	Asp	Asp	Leu	Ser	Val	Ser	Ser
1610						1615					1620			
Ser	Asn	Phe	Thr	Asp	Arg	Asp	Asp	Lys	Ile	Leu	Thr	Arg	Gly	Glu
1625						1630					1635			
Arg	Leu	Asp	Gly	Phe	Gly	Leu	Leu	Leu	Lys	Lys	Ile	Met	Ala	Ile
1640						1645					1650			
Leu	Ile	Lys	Arg	Phe	His	His	Ala	Arg	Arg	Asn	Trp	Lys	Gly	Leu
1655						1660					1665			
Ile	Ala	Gln	Val	Ile	Leu	Pro	Ile	Val	Phe	Val	Thr	Thr	Ala	Met
1670						1675					1680			
Gly	Leu	Gly	Thr	Leu	Arg	Asn	Ser	Ser	Asn	Ser	Tyr	Pro	Glu	Ile
1685						1690					1695			
Gln	Ile	Ser	Pro	Ser	Leu	Tyr	Gly	Thr	Ser	Xaa	Gln	Thr	Ala	Phe
1700						1705					1710			
Tyr	Ala	Asn	Tyr	His	Pro	Ser	Thr	Glu	Ala	Leu	Val	Ser	Ala	Met
1715						1720					1725			
Trp	Asp	Phe	Pro	Gly	Ile	Asp	Asn	Met	Cys	Leu	Asn	Thr	Ser	Asp
1730						1735					1740			
Leu	Gln	Cys	Leu	Asn	Lys	Asp	Ser	Leu	Glu	Lys	Trp	Asn	Thr	Ser
1745						1750					1755			
Gly	Glu	Pro	Ile	Thr	Asn	Phe	Gly	Val	Cys	Ser	Cys	Ser	Glu	Asn
1760						1765					1770			
Val	Gln	Glu	Cys	Pro	Lys	Phe	Asn	Tyr	Ser	Pro	Pro	His	Arg	Arg
1775						1780					1785			
Thr	Tyr	Ser	Ser	Gln	Val	Ile	Tyr	Asn	Leu	Thr	Gly	Gln	Arg	Val
1790						1795					1800			
Glu	Asn	Tyr	Leu	Ile	Ser	Thr	Ala	Asn	Glu	Phe	Val	Gln	Lys	Arg
1805						1810					1815			
Tyr	Gly	Gly	Trp	Ser	Phe	Gly	Leu	Pro	Leu	Thr	Lys	Asp	Leu	Arg
1820						1825					1830			
Phe	Asp	Ile	Thr	Gly	Val	Pro	Ala	Asn	Arg	Thr	Leu	Ala	Lys	Val
1835						1840					1845			
Trp	Tyr	Asp	Pro	Glu	Gly	Tyr	His	Ser	Leu	Pro	Ala	Tyr	Leu	Asn
1850						1855					1860			

Ser	Leu	Asn	Asn	Phe	Leu	Leu	Arg	Val	Asn	Met	Ser	Lys	Tyr	Asp
	1865					1870					1875			
Ala	Ala	Arg	His	Gly	Ile	Ile	Met	Tyr	Ser	His	Pro	Tyr	Pro	Gly
	1880					1885					1890			
Val	Gln	Asp	Gln	Glu	Gln	Ala	Thr	Ile	Ser	Ser	Leu	Ile	Asp	Ile
	1895					1900					1905			
Leu	Val	Ala	Leu	Ser	Ile	Leu	Met	Gly	Tyr	Ser	Val	Thr	Thr	Ala
	1910					1915					1920			
Ser	Phe	Val	Thr	Tyr	Val	Val	Arg	Glu	His	Gln	Thr	Lys	Ala	Lys
	1925					1930					1935			
Gln	Leu	Gln	His	Ile	Ser	Gly	Ile	Gly	Val	Thr	Cys	Tyr	Trp	Val
	1940					1945					1950			
Thr	Asn	Phe	Ile	Tyr	Asp	Met	Val	Phe	Tyr	Leu	Val	Pro	Val	Ala
	1955					1960					1965			
Phe	Ser	Ile	Gly	Ile	Ile	Ala	Ile	Phe	Lys	Leu	Pro	Ala	Phe	Tyr
	1970					1975					1980			
Ser	Glu	Asn	Asn	Leu	Gly	Ala	Val	Ser	Leu	Leu	Leu	Leu	Leu	Phe
	1985					1990					1995			
Gly	His	Ala	Thr	Phe	Ser	Trp	Met	Tyr	Leu	Leu	Ala	Gly	Leu	Phe
	2000					2005					2010			
His	Glu	Thr	Gly	Met	Ala	Phe	Ile	Thr	Tyr	Val	Cys	Val	Asn	Leu
	2015					2020					2025			
Phe	Phe	Gly	Ile	Asn	Ser	Ile	Val	Ser	Leu	Ser	Val	Val	Tyr	Phe
	2030					2035					2040			
Leu	Ser	Lys	Glu	Lys	Pro	Asn	Asp	Pro	Thr	Leu	Glu	Leu	Ile	Ser
	2045					2050					2055			
Glu	Thr	Leu	Lys	Arg	Ile	Phe	Leu	Ile	Phe	Pro	Gln	Phe	Cys	Phe
	2060					2065					2070			
Gly	Tyr	Gly	Leu	Ile	Glu	Leu	Ser	Gln	Gln	Gln	Ser	Val	Leu	Asp
	2075					2080					2085			
Phe	Leu	Lys	Ala	Tyr	Gly	Val	Glu	Tyr	Pro	Asn	Glu	Thr	Phe	Glu
	2090					2095					2100			
Met	Asn	Lys	Leu	Gly	Ala	Met	Phe	Val	Ala	Leu	Val	Ser	Gln	Gly
	2105					2110					2115			
Thr	Met	Phe	Phe	Ser	Leu	Arg	Leu	Leu	Ile	Asn	Glu	Ser	Leu	Ile
	2120					2125					2130			
Lys	Lys	Leu	Arg	Leu	Phe	Phe	Arg	Lys	Phe	Asn	Ser	Ser	His	Val
	2135					2140					2145			
Arg	Glu	Thr	Ile	Asp	Glu	Asp	Glu	Asp	Val	Arg	Ala	Glu	Arg	Leu
	2150					2155					2160			
Arg	Val	Glu	Ser	Gly	Ala	Ala	Glu	Phe	Asp	Leu	Val	Gln	Leu	Tyr
	2165					2170					2175			
Cys	Leu	Thr	Lys	Thr	Tyr	Gln	Leu	Ile	His	Lys	Lys	Ile	Ile	Ala

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